

CLAIMS

1. A method for preconditioning, activating or both of a gas decontamination
2 substrate within a vessel, which comprises:
 - a. filling said vessel containing said substrate with a purging gas and raising
4 said purging gas to an elevated pressure within said vessel;
 - b. maintaining said purging gas at said elevated pressure for a
6 predetermined period of time;
 - c. venting contents of said vessel to an environment having a gas pressure
8 substantially less than said elevated pressure, such that much of said
purging gas and any contents of said vessel displaced by said purging gas
10 are evacuated from said vessel; and
 - d. repeating steps a., b. and c. at least once,
12 whereby said substrate within said vessel becomes preconditioned or
activated or both for subsequent decontamination of a contaminated gas.
2. A method as in Claim 1 wherein said purging gas is the same type of gas
2 as a gas which is to be subsequently decontaminated or is the same type of gas
as a principal component of a gas mixture which is to be subsequently
4 decontaminated.
3. A method as in Claim 1 wherein the pressure differential between said
2 elevated pressure and said lesser gas pressure of said environment is at least a
factor of two.
4. A method as in Claim 3 wherein the pressure differential between said
2 elevated pressure and said lesser gas pressure of said environment is at least a
factor of five.
5. A method as in Claim 3 wherein the pressure differential between said
2 elevated pressure and said lesser gas pressure of said environment is a factor

in the range of from 2 to 10^{10} .

2 6. A method as in Claim 5 wherein the pressure differential is up to 10^8 when the lesser gas pressure is subatmospheric or up to 10^4 when the lesser gas pressure is substantially atmospheric.

2 7. A method as in Claim 1 wherein said steps a., b. and c. are repeated 2-200 times.

2 8. A method as in Claim 7 wherein said steps a., b. and c. are repeated 10-100 times.

2 9. A method as in Claim 1 where each said step b. is continued for a period of 10 seconds to 10 minutes.

2 10. A method as in Claim 1 wherein said purging gas is a mixture of at least two gases.

2 11. A method as in Claim 10 wherein one of said gases is present in said mixture in a concentration in the range of 5 ppm to 5 percent of said mixture.

2 12. A method as in Claim 10, further comprising that the relative concentrations of the gases in said mixture does not substantially change during operation of said method.

2 13. A method as in Claim 1 wherein said purging gas is a bulk gas, a speciality gas or a gas mixture.

2 14. A method as in Claim 13 wherein said purging gas comprises hydrogen, oxygen, nitrogen, argon, hydrogen chloride, ammonia, air, carbon dioxide, helium, silane, germane, diborane, phosphine, arsine or mixtures thereof.

15. A method as in Claim 1 wherein said subsequent decontamination of said
2 contaminated gas comprised reduction of concentration of contaminants to a
level of no greater than 1 ppm.

16. A method as in Claim 15 wherein said subsequent decontamination of said
2 contaminated gas comprised reduction of concentration of contaminants to a
level of on the order of 1-10 ppb.

17. A method as in Claim 16 wherein said subsequent decontamination of said
2 contaminated gas comprised reduction of concentration of contaminants to a
level of on the order of 1-100 ppt.

18. A method as in Claim 1 wherein said substrate is porous.

19. A method as in Claim 18 wherein said substrate has a surface area of at
2 least 100 m²/g.

4 20. A method as in Claim 18 wherein said method is used to accomplish
activation of decontamination sites on the surface of said substrate.

21. A method as in Claim 18 wherein said method is used to accomplish
2 preconditioning of said substrate by purging its content of a packing gas.

22. A method as in Claim 21 wherein preconditioning causes a chemical
2 reaction which generates a gaseous byproduct and accomplishing
preconditioning of said substrate comprises purging its content of said packing
4 gas and of said byproduct.

23. A method as in Claim 1 wherein said steps a., b. and c. are repeated until
2 the temperature within said vessel passes through a maximum value and
decreases to a substantially constant equilibrium value.